EIGHTH BIMONTHLY PROGRESS REPORT

UNIVERSITY OF ALASKA

ERTS PROJECT 110-8

A. TITLE OF INVESTIGATION: Sea, Ice and Surface Water Circulation, Alaskan Continental Shelf

B. PRINCIPAL INVESTIGATOR/GSFC ID: G. D. Sharma, F. F. Wright, J. J. Burns/ UN 683

C. PROBLEMS IMPENDING INVESTIGATIONS: None

D. PROGRESS REPORT:

1. Accomplishments during reporting period: Determination of suspended loads in waters from Bering and Chukchi Seas and the Gulf of Alaska shelf is completed. Over 150 images of one or more MSS bands from various areas have been color coded using VP-8 density slicing equipment. Excellent correlation between suspended loads and reflectance grades as coded by various colors have been observed in test area. An attempt to establish similar correlation in other areas to delineate surface water circulation is underway.

2. Plans for next reporting period: Color coded ERTS images will be projected on a base map and distribution of suspended load will be deciphered. The distribution pattern obtained will then be compared with the available ground truth data to delineate surface water circulation on the Alaskan shelf.

E. SIGNIFICANT RESULTS: Suspended load distribution in the Bering Sea during summer varies significantly. In areas of phytoplankton bloom and at the river mouths the suspended load is higher than the 1 mg/l which is

found over most areas. The influence of major rivers (Yukon and Kuskokwim rivers) on temperature, salinity and suspended load in surface water as well as at shallow depth is apparent. On the Bering Sea shelf a strong pycnocline generally at depth 10-20 m is formed by surface fresh water flow which retains sediment in suspension over extended period. These sediment plumes form excellent signature on ERTS imagery and are useful tracer for determining the surface circulation in the region.

F. PUBLICATIONS: See attached abstracted

H. CHANGES IN STANDING ORDER FORMS: None

I. ERTS IMAGE DESCRIPTOR FORMS: Attached

J. DATA REQUEST FORM: None

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DISCIPLINE: Marine Geology and Ecology

SUMMARY OF SIGNIFICANT RESULTS:

ERTS imagery has been extremely useful in understanding the tidal water movements in a large estuary such as Cook Inlet. As more imagery obtained during various tidal stages become available it appears that complex and fast changing micro-circulation patterns develop in various regions of Cook Inlet during each advancing and receding tide. More ERTS synoptic imagery is needed to fully understand the effect of the approach of tidal front on the water movements in the various regions through the estuary. The conventional onboard ship data gathered during various cruises although revealed the overall circulation pattern in Cook Inlet but failed to show micro-subgyres which develop in various regions during each tide which are discernable on the ERTS imagery.

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

NDPF USE ONLY
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ID

DATE 30 November 1973

PRINCIPAL INVESTIGATOR G. D. Sharma

GSFC UN 683

ORGANIZATION University of Alaska

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Sediment plume	Coast	Estuary	River
1387-20275-M	X	X	X	X
1387-20281-M	X	X		X
1387-20284-4	X			
1388-20333-M	X	X	X	X
1388-20335-M	X	X		X
1388-20342-4	X			
1388-20344-4	X			
1389-20391-M	X	X	X	X
1389-20394-M	X	X	X	
1389-20400-4	X	X		
1389-20403-4	X			
1390-20450-M	X	X	X	X
1390-20452-M	X	X	X	
1406-20331-M	X	X	X	X
1406-20334-M	X	X	X	X
1406-20340-4	X			
1406-20343-4	X			

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

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301-982-5406

GSFC 37-2 (7/72)

ERTS IMAGERY APPLIED TO ALASKAN COASTAL PROBLEMS

F. F. Wright*, G. D. Sharma**, D. C. Burbank**, and J. J. Burns***

ABSTRACT

Along the Alaskan coast, surface water circulation is relatively easy to study with ERTS imagery. Highly turbid river water, sea ice, and fluvial ice have proven to be excellent tracers of the surface waters. Sea truth studies in the Gulf of Alaska, Cook Inlet, Bristol Bay, and the Bering Strait area have established the reliability of these tracers. ERTS imagery in the MSS 4 and 5 bands is particularly useful for observing lower concentrations of suspended sediment, while MSS 6 data is best for the most concentrated plumes. Where satellite-synchronous sea truth was available, optical density slicing techniques have been developed to permit the quantitative discrimination of suspended sediment concentrations. Ice features are most clearly seen on MSS 7 imagery; fracture patterns and the movement of specific floes can be used to map circulation in the winter when runoff is restricted, if appropriate allowance is made for wind influence. Current patterns interpreted from satellite data are only two-dimensional, but since most biological activity and pollution are concentrated near the surface, the information developed can be of direct utility. Details of Alaskan inshore circulation of importance to coastal engineering, navigation, pollution studies, and fisheries development have been clarified with satellite data. ERTS has made possible the analysis of circulation in many parts of the Alaskan coast which were extremely difficult to study using standard oceanographic techniques.

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